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Predictability of multi-year SST trends in the North Pacific in an MPI-ESM hindcast ensemble

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We investigate the hindcast skill of multi-year linear trends of SST anomalies in the North Pacific in a decadal prediction system based on the global coupled Max Planck Institute for Meteorology Earth System Model (MPI-ESM). Hindcasts are intialized yearly from 1961 to 2014 from a simulation where we assimilate monthly surface and sub-surface oceanic temperature and salinity with an ensemble Kalman filter (EnKF), while atmospheric variables are nudged to monthly ECMWF re-analysis data. We analyse the mean of 8 ensemble members, and compare to HadISST observations.

For the conventional lead year analysis, hindcast skill of SST anomalies in the North Pacific is limited to few years. The same applies to the Pacific Decadal Oscillation (PDO) that commonly shows hindcast skill only for 1 to 2 years. With the use of multi-year linear trends, we find hindcast skill of SST anomalies in the North Pacific regionally extended. Most notably, we find the variability of SST anomalies over the entire North Pacific, in other words the PDO signal, to be reproducible in our hindcasts for trend lengths of up to 10 years.